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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/092,956	KEMP ET AL.
	Examiner	Art Unit
	Jennifer A. Leung	1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-99 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-99 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 07 March 2002 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "the distribution-blending area 222" (see sections [0025], [0027], [0032], [0045]). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

- Section [0002], lines 1-3 "... acid and base chemicals can be mixed together within a vented reaction chamber cannot be enclosed, it will blow up like a big bomb if it is not vented." is not in proper grammatical form.
- Section [0006], lines 6-9 "The apparatus allows an acid (e.g. sulfuric acid) and a base (e.g. calcium hydroxide in the form of a slurry) the calcium hydroxide could be sprayed, dry, into the dish..." is not in proper grammatical form.

Appropriate correction is required.

3. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claims 7-9, 11, 12, 16, 17, 52, 54, 56, 68-70, 72, 77, 78, 90, 94 and 95 are objected to because of the following informalities:

- In claim 7, "corrosive coating" should be changed to -- non-corrosive coating --. Also, "fluro polymers" should be changed to -- fluoro polymers --.
- In claim 8, "tetraflouro" should be changed to -- tetrafluoro --.
- In claim 9, -- a -- should be inserted before "temperature".
- In claim 11, -- a -- should be inserted before "temperature".
- In claim 12, -- dish -- should be inserted after "distribution-blending-cooling" (line 5).
- In claim 16, "fluro polymers" should be changed to -- fluoro polymers --.
- In claim 17, "tetraflouro" should be changed to -- tetrafluoro --.
- In claim 47, "particle" (line 3) should be changed to -- particles --.
- In claim 52, -- a -- should be inserted before "temperature".
- In claim 54, "acid flow valve" should be changed to -- base flow valve --.
- In claim 56, "an base flow controller that monitors an base flow meter" should be changed to -- a base flow controller that monitors a base flow meter --.
- In claim 68, "fluro polyerms" should be changed to -- fluoro polymers --.
- In claim 69, "tetraflouro" should be changed to -- tetrafluoro --.
- In claim 70, -- a -- should be inserted before "temperature".
- In claim 72, -- a -- should be inserted before "temperature".
- In claim 77, "fluro plymers" should be changed to -- fluoro polymers --.
- In claim 78, "tetraflouro" should be changed to -- tetrafluoro --.
- In claim 90, "particle" (line 3) should be changed to -- particles --.
- In claim 94, -- a -- should be inserted before "temperature".
- In claim 95, "the acid flow meter" (line 3) should be changed to -- the base flow meter --.

Appropriate correction is required.

5. Claims 41 and 94-96 are objected to because of improper claim dependency:

- Claim 41, which improperly depends from claim 41.
- Claim 94, which improperly depends from claim 94.
- Claim 95, which improperly depends from claim 79.
- Claim 96, which improperly depends from claim 96.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2-5, 13, 14, 19-23, 25-30, 33, 38, 43, 46-48, 57, 59-61 and 62-99 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 2-5 and 63-66, the language of the claim is directed to a method limitation which renders the claim vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "the acid" and "the base" are not considered elements of the apparatus.

With respect to claims 13-14 and 74-75, the phrases "adequate size", "minimal depth" and "broad distribution" are considered vague and indefinite, since "adequate", "minimal" and "broad" are relative terms.

With respect to claims 19-21, it is unclear as to the structural limitation applicants are attempting to recite by, "the acid delivery system comprises in-air mixing." and furthermore, the

language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "in-air mixing" is not considered an element of the apparatus. In addition, "large amounts" (claim 20) is considered vague and indefinite, since "large" is a relative term.

With respect to claims 21-23 and 27-29, the phrase "hard particles" is considered vague and indefinite, since "hard" is a relative term. Furthermore, in claims 22-23 and 28-29, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "the hard particles" is not considered an element of the apparatus.

With respect to claims 25-27, it is unclear as to the structural limitation applicants are attempting to recite by, "the base delivery system comprises in-air mixing." and furthermore, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "in-air mixing" is not considered an element of the apparatus. In addition, "large amounts" (claim 26) is considered vague and indefinite, since "large" is a relative term.

With respect to claim 30, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "a slurry" is not considered an element of the apparatus.

With respect to claims 33 and 80, it is unclear as to where "an acid reservoir cooling coil coupled to the acid reservoir" is disclosed in the specification and drawings.

With respect to claims 38, 57, 82 and 96, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what

structural elements the applicants are attempting to recite, since "the predetermined level" is not considered an element of the apparatus.

With respect to claim 43, "the dilute acid" lacks proper positive antecedent basis. See also claims 45, 46, 86, 88 and 89.

With respect to claims 46 and 89, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "the rotational speed of the dilute acid" and "size of the vortex" are not considered an element of the apparatus. Furthermore, "can maximize" is considered vague and indefinite.

With respect to claims 47 and 90, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite by, "wherein the acid and the base are mixed within a thin layer on the distribution-blending-cooling dish to form a suspension that contains hard particles of an un-reacted base..." since "the acid" and "the base" are not considered elements of the apparatus. Furthermore, "hard particles" is considered vague and indefinite, since "hard" is a relative term.

With respect to claim 48 and 92, the language of the claims is directed to a method limitation which renders the claims vague and indefinite as it is unclear as to what structural elements the applicants are attempting to recite, since "the vortex" is not considered an element of the apparatus.

With respect to claims 59 and 97, it is unclear as to the structural relationship of "a precipitate chamber" to the other elements of the apparatus.

With respect to claim 60 and 98, it is unclear as to the structural relationship of "a filter chamber" to the other elements of the apparatus.

With respect to claim 61 and 99, it is unclear as to the structural relationship of "a storage chamber" to the other elements of the apparatus.

With respect to claim 62, it is unclear as to the relationship between "the acid delivery systems" (lines 14-15) and "an acid delivery system" set forth in line 5.

With respect to claims 86-88, "the vortex generator", "the circulation injectors" and "the plurality of injectors" lack proper positive antecedent basis.

With respect to claim 94, "the base reservoir" lacks proper positive antecedent basis.

With respect to claim 95, "the base flow meter", "the base flow valve" and "the acid flow meter" lack proper positive antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-5, 13, 14, 18-39, 49, 50, 51-66, 74-75, 80, 83, 94 and 97-99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradford (U.S. 3,881,700).

With respect to claims 1, 62 and 83, Bradford (FIG. 1, 4; column 2, line 37 to 3, line 29) discloses an apparatus comprising:

a) a chamber (i.e. defined by cylindrical tank **16**);

b) a dish (i.e. cup-shaped member **38**) suspended therein;

c) a raw water delivery system (i.e. comprising pump **12** and conduits **10**, **14**, **46**) for introducing or spraying raw water into the chamber and to the dish **38** (see FIG. 4, which illustrates the spray of solution exiting via holes **48** in the form of directional arrows); and

d) a chemical delivery system (i.e. comprising pump and supply **22**, and conduits **20**, **14**, **46**) for introducing or spraying a chemical into the chamber via the dish **38** (see FIG. 4, which illustrates the spray of solution exiting via holes **48** in the form of directional arrows).

Dish **38** comprises a "distribution-blending-cooling" dish, since the dish distributes the solution of water and chemical by deflecting the mixture upwards towards the top of the chamber, and further blends as well as inherently cools the mixture via the turbulent mixing caused by the collision of the solution with the dish (column 1, lines 44-55). In addition, the delivery systems (comprising electrical pump **12** and chemical pump/ supply **22**) are inherently capable of regulating a rate of flow and amount of water introduced or sprayed into the chamber since it is well known in the art that pumps comprise means for speed or feed rate adjustment. Although Bradford is silent as to whether specifically an "acid" or "base" may be introduced via

the delivery systems, Bradford discloses, "Many different types of conventional chemicals can be utilized in the purification," and further lists examples of aluminum sulphate in combination with liquid lime and calcium chloride (column 4, lines 21-26). Furthermore, Bradford discloses, "[t]he tank may be constructed of any suitable material such as stainless steel, plastic or sheet metal that does not react with the chemicals when combined with water." (column 2, lines 55-59). Therefore, the apparatus of Bradford structurally meets the claim and would be inherently capable utilizing acid and base, depending on the intended use of the apparatus.

With respect to claims 2-5 and 63-66, no further structural limitations are recited, since "the acid" and "the base" are not considered elements of the apparatus. Therefore the apparatus of Bradford meets the claims.

With respect to claims 13-14 and 74-75, Bradford discloses, "[t]he-cup shaped member has a square bottom **40** with side walls **42** extending upwardly therefrom at an angle approximately 45 degrees." and "[f]or best results, the angle of the side wall should extend upwardly and outwardly at an angle between 45 degrees and 60 degrees." (column 3, lines 5-12). Bradford also discloses, "[i]t has been found that the depth of the cup should be three times the diameter of the delivery pipe **46** so as to confine the water within the cup **38** to produce sufficient turbulence." (column 4, lines 18-21). Therefore, the dish **38** is inherently of, "an adequate size/a minimal depth and shape to allow broad distribution of the solution". In any event, it has been held that changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878) and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

With respect to claims 18 and 24, Bradford discloses the delivery systems comprise a spray mechanism (FIG. 4, which illustrates the spray of solution exiting via holes **48** in the form of directional arrows).

With respect to claim 19-21 and 25-27, no further structural limitations are recited, since "in-air mixing" is not considered an element of the apparatus. Therefore the apparatus of Bradford meets the claims. In any event, Bradford discloses that the solution flow reversal as caused by the deflection of the solution towards the top of the chamber (i.e. via travel "in-air") aids in mixing and dissolving all of the chemicals left in the water and completes the formation of floc (column 1, lines 44-55).

With respect to claims 22-23 and 28-29, no further structural limitations are recited, since "the hard particles" are not considered an element of the apparatus but a product depending from the intended use of the apparatus. Therefore the apparatus of Bradford meets the claims.

With respect to claim 30, no further structural limitations are recited, since "a slurry" is not considered an element of the apparatus. Thus the apparatus of Bradford meets the claim. In any event, Bradford discloses the delivery of an inherently slurry like chemical (i.e. aluminum sulphate in combination with liquid lime and calcium chloride; column 4, lines 22-26).

With respect to claims 31 and 49, Bradford (FIG. 1, 4; column 2, lines 37-50; column 3, lines 18-21) further discloses the delivery systems each comprise:

a) a pump (i.e. electrical pump **12** or chemical pump and supply **22**); and

b) a delivery nozzle (as defined by holes **48** of conduit **46**), wherein the pump and the delivery nozzle are coupled thereto to introduce the materials into the chamber.

With respect to claims 32 and 50, Bradford discloses the delivery systems each comprise

a reservoir (i.e. any suitable source of raw water or the chemical pump and supply 22; column 2, lines 37-50) for the material being introduced into the chamber (i.e. which may comprise acid or base, depending on the intended use).

With respect to claims 33, 51, 52, 80 and 94, although Bradford is silent as to a cooling coil and temperature sensor coupled to the material reservoirs, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to provide such cooling means for the apparatus of Bradford, on the basis of suitability for the intended use and absent showing any unexpected results, since the cooling of raw materials prior to introduction to a process and the use of cooling coils coupled to temperature sensors as the cooling means is well known in the art.

With respect to claims 34, 39, 53 and 58, the electrical pump **12** and the chemical pump and supply **22** of Bradford are inherently capable of regulating the rate of flow or the amount of the material into the chamber, since it is conventionally known in the art that pumps comprise means for speed or feed rate adjustment.

With respect to claim 35-38 and 54-57, although Bradford is silent as to the regulation of the flow rate via flow valves, flow meters, and flow controllers, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such control elements to the apparatus of Bradford, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since flow valves, flow meters, and flow controllers are well known flow regulation means in the art.

With respect to claims 59 and 97, Bradford further discloses, "[t]he chemicals carried within the solution into the tank through the conduit **14** causes formation of floc," and

"[n]ormally, this floc layer is formed in the lower portion of the tank..." (column 3, lines 29-36). Therefore, the apparatus of Bradford comprises a precipitate chamber (i.e. the lower portion of the tank) allowing the precipitation of solids.

With respect to claims 60 and 98, Bradford discloses, "conduit **72** may be coupled to a rapid sand filtering system," (column 4, lines 3-5) thus comprising a filter chamber for filtering the mixture.

With respect to claims 61 and 99, Bradford further discloses the mixture exiting the apparatus may be fed to a storage tank for storing the mixture (column 4, lines 10-12).

8. Claims 6-8, 15-17, 67-69 and 76-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradford (U.S. 3,881,700) with respect to Van Loenen (U.S. 2,930,677).

With respect to claims 6-8, 15-17, 67-69 and 76-78, Bradford discloses, "the tank may be constructed of any suitable material... that does not react with the chemicals when combined with the water," (column 2, lines 55-59). However, Bradford is silent as to whether an inside surface of the chamber defined by tank **16** or the dish **38** may comprise a non-corrosive coating such as a derivative of fluoro polymers or ethyl tetrafluoro ethylene. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to provide such a coating to the apparatus of Bradford, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since the use of such non-corrosive coatings is conventionally known in the art, as evidenced by Van Loenen. Van Loenen teaches a coating for walls of process vessels and conduits employed in caustic processes, wherein the coating may comprise thermoplastic resins such as polytetrafluoro ethylene, or Teflon ^{TM} (column 4, line 44-column 5, line 2). In addition, the Teflon ^{TM} coating reduces the

tenacity toward scale formation as compared to the tenacity exhibited by the scale formations to metal surfaces of processing vessels.

9. Claims 1-5, 13, 14, 18-32, 34-40, 42, 49, 50, 53-58, 61-66, 74-75, 83, 84 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (U.S. 5,782,556).

With respect to claims 1, 62 and 83, Chu (FIG. 1-3; column 2, line 13-column 3, line 30) discloses an apparatus comprising:

a) a chamber (i.e. defined by secondary tank **21**);

b) a dish suspended therein (i.e. conical filter **27**, comprising a perforated film plate converging downward and having a dish shape);

c) an oil-in-water phase mixing liquid delivery system (comprising delivery pipe **15** and charging pump **151**) for introducing the oil-in-water phase mixing liquid into the chamber **21** and to the dish **27** via spraying **25**; and

d) an oil delivery system (comprising oil feeder pipe **261** and charging pump **262**) for introducing the oil into the chamber **21** via the dish **27** via spraying **26**.

Dish **27** comprises a "distribution-blending-cooling" dish, since the dish distributes and blends the materials by, "diffusing and homogeneously mixing the oil and mixing liquid as sprayed from the outer and inner annular sprayers **26**, **25** for draining into a lower portion of the secondary tank **21**..." (column 2, lines 56-62), and the dish **27** would inherently cool the mixture via heat loss upon diffusing and mixing, depending on the materials mixed. In addition, the delivery systems (comprising charging pumps **151** and **262**) are inherently capable of regulating a rate of flow and amount of water introduced or sprayed into the chamber since it is well known in the art that pumps comprise means for speed or feed rate adjustment. Although Chu is silent

as to whether specifically an "acid" or "base" may be introduced via the delivery systems, the apparatus of Chu meets the claims, since the selection of materials to be introduced into the mixer is merely a matter of intended use, which holds no patentable weight in apparatus claims. Furthermore, the apparatus of Chu comprises substantially the recited structural elements, and should therefore be fully capable of utilizing acid or base.

With respect to claims 2-5 and 63-66, no further structural limitations are recited, since "the acid" and "the base" are not considered elements of the apparatus but a matter of intended use. Therefore the apparatus of Chu meets the claims.

With respect to claims 13-14 and 74-75, although Chu is silent as to the specific dimensions of the dish **27** (for instance, whether the dish is of, "an adequate size/a minimal depth and shape to allow broad distribution of the solution"), it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate dimension and shape for the dish of Chu, on the basis of suitability for the intended use and absent showing any unexpected results, since it has been held that changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878) and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

With respect to claims 18 and 24, Chu further discloses the delivery systems each comprise a spray mechanism (i.e. outer and inner annular sprayers **26**, **25**).

With respect to claim 19-21 and 25-27, no further structural limitations are recited, since "in-air mixing" is not considered an element of the apparatus. Therefore the apparatus of Chu

meets the claims.

With respect to claims 22-23 and 28-29, no further structural limitations are recited, since "the hard particles" are not considered an element of the apparatus but a product depending from the intended use of the apparatus. Therefore the apparatus of Chu meets the claims.

With respect to claim 30, no further structural limitations are recited, since "a slurry" is not considered an element of the apparatus, and therefore the apparatus of Chu meets the claim. In any event, Chu discloses the delivery of an inherently slurry like component (i.e. the oil-in-water phase mixing liquid comprising water, oil, catalyst, emulsifying agent, and stabilizer; column 1, line 59 to column 2, line 9), and therefore the apparatus would inherently be capable of utilizing a slurry of base and water.

With respect to claims 31 and 49, Chu (FIG. 1; column 2, lines 46-56; column 3, lines 1-7) further discloses the delivery systems each comprise:

a) a pump (i.e. charging pump **151** or **262**); and

b) a delivery nozzle (i.e. plurality of spray holes or perforations **260** for outer annular sprayer **26**; plurality of spray nozzle **251** for inner annular pipe **25**), wherein the pump and the delivery nozzle are coupled thereto to introduce the materials into the chamber.

With respect to claims 32 and 50, Chu further discloses a reservoir (tank **11**) for the oil-in-water phase mixing liquid being introduced into the chamber **21**, and a supply of "raw heavy oil, fuel oil or crude oil O2", which would inherently comprise a reservoir in order to maintain the supply. Whether the reservoirs comprise acid or base would be a matter of intended use.

With respect to claims 34, 39, 53 and 58, the charging pumps **151**, **262** of Chu are inherently capable of regulating the rate of flow or the amount of the material into the chamber,

since it is conventionally known in the art that pumps comprise means for speed or feed rate adjustment.

With respect to claim 35-38 and 54-57, although Chu is silent as to the regulation of the flow rate via flow valves, flow meters, and flow controllers, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such control elements to the apparatus of Chu, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since flow valves, flow meters, and flow controllers are well known flow regulation means in the art.

With respect to claims 40 and 84, Chu (FIG. 1, 3) discloses sprayers **25**, **26** introduce the materials into the chamber at different points (i.e. at different radial points via the plurality of spray holes or nozzles **260**, **251**).

With respect to claim 42, a vortex may be defined as a spiral motion of fluid within a limited area, especially a whirling mass of water or air that sucks everything near it toward its center. As illustrated by the eddy flows **E**, **E'** in FIG. 1, the flow of fluid is generally of a whirling or spiraling motion, and therefore the turbine agitator **22** of Chu meets the claim of a vortex generator.

With respect to claims 61 and 99, Chu further discloses the mixture exiting the apparatus may be fed to a storage tank for storing the mixture (column 2, lines 65-68).

10. Claims 41, 43-48 and 85-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (U.S. 5,782,556), as applied to claims 1, 40, 42 62 and 84 above, and further in view of Platz, deceased, et al. (U.S. 4,164,541).

With respect to claims 41, 43-45 and 85-88, Chu discloses the use of the turbine agitator

22 as the means for generating the vortex but is silent as to whether the vortex may be generated by other means, such as a plurality of circulation eductors inside the chamber in fluid communication with a pump. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select another means for generating the vortex in the apparatus of Chu, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since the use of eductor/pump systems for generating a vortex is conventionally known in the art, as evidenced by Platz et al., and furthermore, the substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). In particular, Platz et al. (FIG. 1, 2, 3, 5; column 2, line 47 to column 5, line 46) teach a mixing chamber **10** comprising a plurality of eductors (i.e. venturi pumps **20**, **20'**, **21**) mounted inside the chamber at different elevations, wherein the eductors are in fluid communication with an electric auxiliary pump **18**, **18'** via outlet lines **19**, **19'**. As illustrated, the placement or direction of the eductors controls the formation of the vortex (i.e. the flow lines indicating circular fluid flow). By incorporation of a plurality of eductors to the apparatus of Chu, the acid delivery system would introduce the acid into the chamber at different points, comprising points below and above the dish.

With respect to claims 46, 48, 89 and 92, no further structural limitations are recited, since the "rotational speed of the dilute acid", "size of the vortex" and "vortex" as generated by the eductors are not considered elements of the apparatus, and therefore the modified apparatus

of Chu meets the claim. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate speed or size for the vortex for enhancing the *in situ* mixing in the modified apparatus of Chu, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

With respect to claims 47 and 90, no further structural limitations are recited, as the language of the claim is drawn to a method limitation, and therefore the modified apparatus of Chu meets the claim.

With respect to claim 91, the collective teachings of Chu and Platz et al. are silent as to whether the pump in the modified apparatus (i.e. electric auxiliary pumps **18**, **18'** as taught by Platz et al.) may comprise specifically is a peristaltic pump. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate pump, such as a peristaltic pump, for the pump in the modified apparatus of Chu, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); In re Ruff 118 USPQ 343 (CCPA 1958).

11. Claims 1-5, 9-14, 62-66, 70-75 and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balla et al. (GB 2 236 694).

With respect to claims 1, 62, and 83, Balla et al. (Figure) disclose an apparatus comprising a chamber (i.e. interior **33** defined by reactor **11**); a dish suspended therein (i.e. the inner vessel of reactor **11**; page 6, lines 5-7; page 7, lines 4-7); and a delivery system for

introducing the materials into the chamber and to the dish (i.e. feeder **19**; page 3, second to last paragraph). The dish comprises a "distribution-blending-cooling" dish, since the dish distributes and blends the materials **34** participating in the reaction and also cools the materials **34** via cooling means **35**, **40**, **41**, **42**. In addition, the delivery system **19** is inherently capable of regulating a rate of flow and amount of materials introduced into the chamber (i.e. "the feeding may be simply automated at little extra expense"; page 6, second to last bullet). Although Balla et al. are silent as to whether the materials may comprise specifically an "acid" or "base", the apparatus of Balla et al. meets the claims, since the selection of materials to be introduced is merely a matter of intended use. The apparatus of Balla et al. comprises substantially the recited structural elements and should therefore be fully capable of utilizing an acid or base.

With respect to claims 2-5 and 63-66, no further structural limitations are recited, since "the acid" and "the base" are not considered elements of the apparatus, and therefore the apparatus of Balla et al. structurally meets the claims.

With respect to claims 9-10 and 70-71, Balla et al. (Figure; page 2, last paragraph to page 4, third to last paragraph) disclose the cooling means comprises a cooling coil **35** coupled to the chamber **33**, wherein a control temperature sensor **31** cooperates with the cooling coil to regulate the temperature of the chamber (i.e. via control unit **15**).

With respect to claim 11-12 and 72-73, Balla et al. (Figure; page 2, last paragraph to page 4, third to last paragraph) disclose the cooling means comprises a cooling coil **35** coupled to the dish (i.e. inner vessel of reactor **11**), wherein a control temperature sensor **31** cooperates with the cooling coil to regulate the temperature of the dish (i.e. via control unit **15**).

With respect to claims 13-14 and 74-75, Balla et al. disclose that the dish (i.e. inner

vessel of reactor **11**) may be exchangeable in order to match the actually required volume (page 6, paragraph 2), and therefore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select a dish of adequate size/minimal depth and shape to achieve a required volume in the apparatus of Balla et al. Furthermore, it has been held that changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878) and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Fabry, Rouech et al. and Akaboshi et al. are provided to illustrate the state of the art.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung JAL

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PRIMARY EXAMINER